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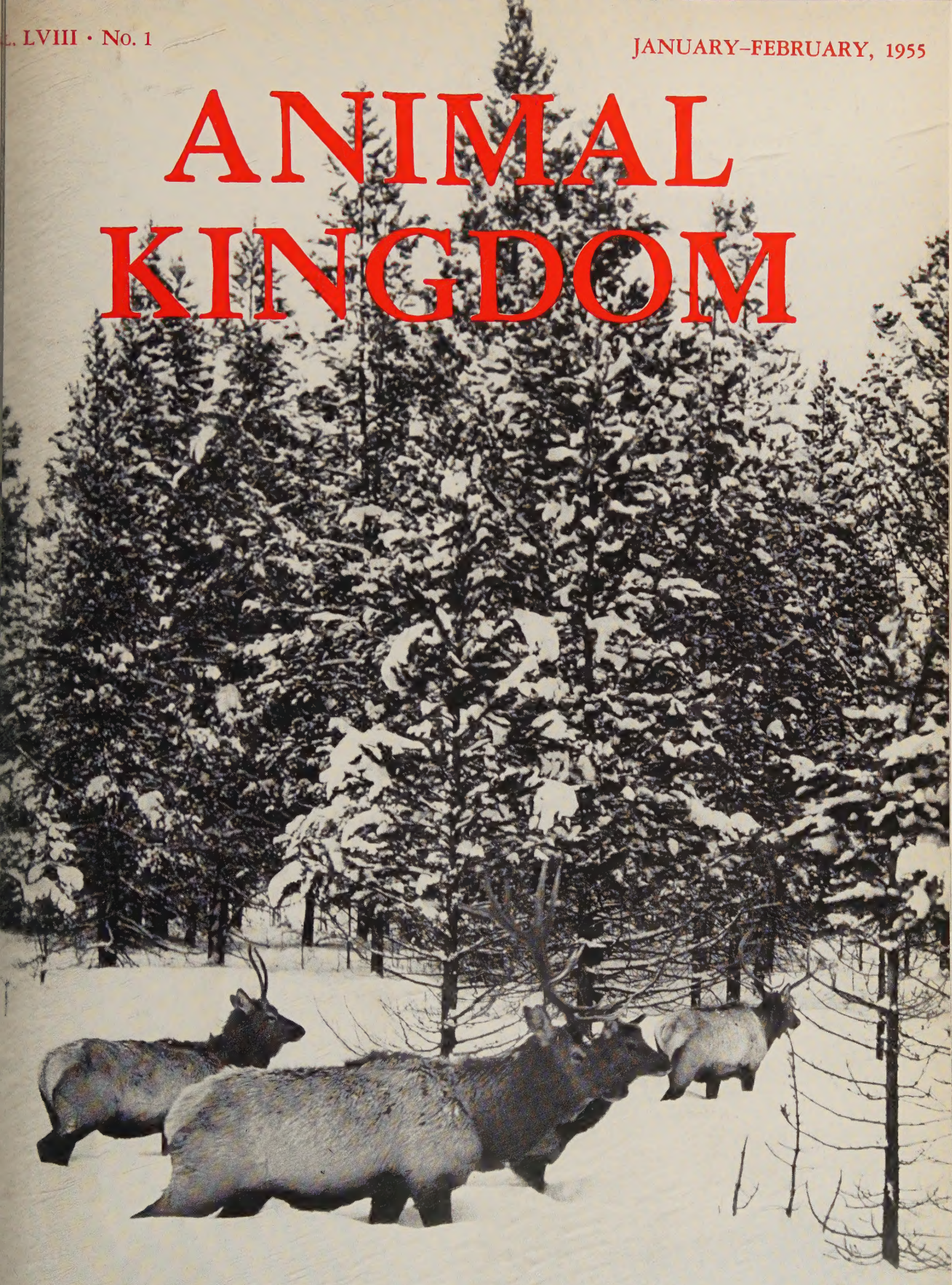
ANIMAL KINGDOM



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ANIMAL KINGDOM

Bulletin of the New York Zoological Society

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The Gold Medal

WITHIN THE LAST DECADE the Gold Medal of our Society has been awarded four times. It is not given *perforce*, so to speak, for there is no compulsion to award it annually. Consequently it is only given when it seems that some individual has conspicuously served one or more of the purposes of our institution.

A prince among men and a leader in the cause of conservation, Frederic C. Walcott, received it in 1946. Then there was a pause for awhile and now, within the last three years, it has been awarded successively to Rachel Carson, in 1953, as interpreter of life within the oceans, last year to Robert M. Yerkes as an eminent pioneer in psychobiology, and this year to Konrad Z. Lorenz as a gifted and patient translator of the actions of animals. Dr. Lorenz has been extraordinary in his contributions to the understanding of animal life. Julian Huxley, in his foreword to Dr. Lorenz's recent book, KING SOLOMON'S RING, writes ". . . Lorenz has done more than any single man to establish the principles (of animal behavior) and to formulate the essential ideas behind them. And then Lorenz has given himself over, body and soul, to his self-appointed task of really understanding animals, more thoroughly than any other biologist-naturalist that I can think of. This has involved keeping his objects of study in what amounts to the wild state, with full freedom of movement. His readers will discover all that this has meant in the way of hard work and inconvenience — sometimes amusing in retrospect, but usually awkward enough or even serious at the time."

The world of nature is fortunate that there are such people as these. Our Gold Medal serves as a token of the admiration of our Society for their accomplishments.

Fairfield Osborn

The author's observation platform overlooking a salt-lick glade deep in the forest. Seladang and elephants, deer, tapirs, wild pigs and a host of other animals come to this open spot.

All photographs by the Author

A GAME WARDEN LOOKS AT THE

MALAYAN SELADANG

By CHARLES S. OGILVIE

Acting Chief Game Warden, Federation of Malaya

SELADANG, pronounced "slah-dahng," is a synonym for Gaur, and is the Malay for this the grandest of the Ox tribe. It is known to science as *Bos gaurus*. In India and Burma, where it reaches its greatest size, it has commonly been known to sportsmen as the Bison. It is considered by them, as it is by sportsmen in Malaya, the most magnificent animal of the chase. Perhaps they are right in this, for to track through heavy forest a great old bull of this species, and to bring it to earth after a long and very arduous trek, is no mean feat. It must live very long in hunters' memories.

I have never killed a Seladang and have never wanted to. Perhaps I have some bovine blood in my early ancestry. Be that as it may, I have been called upon to destroy other great beasts which had put themselves beyond the pale. That was a duty and caused no heartburn until the hunt was over. One cannot love animals and shoot them without horrible after-feelings; at least when one's blood has cooled from its youthful heat. For thirty-six of my fifty-nine years it has been my very good fortune to be in Malaya. During all that time I have been intensely interested in our indigenous fauna and for the past seventeen years it has been my privilege to serve that country as Game Warden. That has allowed me all my days and nights to study some of our rich fauna, and what follows are some of my gleanings. These relate to the Seladang, their behavior and their reactions in the presence of man and some other animals.

A large bull of the species may stand as high as six feet at the highest point of its great dorsal ridge. It has been estimated by many observers that such a beast may weigh well over 2,000 pounds. The cows are smaller, but some I have observed have been quite bull-like in appearance and bulky too. Such may easily be mistaken for a fair bull by one who is no novice in the observation of Seladang. They are very uncommon and after but little experience the novice may easily differentiate the sexes by the appearance of their horns.

Calves at birth have the body color a pale red

fawn to a pale brick red. They also possess a long dark bay dorsal stripe which submerges into the color scheme of the coat as the beast matures. All animals, both young and old, have four distinct white stockings. In mature beasts the body color over the back and sides is very deep dark bay and has often been described as black in old bulls. The color recorded depends upon the light and upon the angle at which the beast is viewed. Sometimes, seen from a position astern, quite a reddish color is recorded by the observers' eyes in even very old animals. By the time a calf has reached the age of one month its body coat starts to darken. By the age of two months it is patchy red and brown. By four months it has become an even dark brown, and at six months an even light bay. So on it keeps darkening until at two years it has become a deep dark bay.

All Seladang I have observed in life possess a distinct dewlap which is noticeable at the tenderest age. This dewlap develops with age, as does a fringe along it of sparse, long, dark hairs. So, too, a general feature is the high arch

Some of the characters in the little dramas of the glade. The Seladang cow, Curlyhorn, is in the center with one of her twin calves. Bullhead, another cow, is behind her, looking toward the thick forest.

between the horns of the Malayan Seladang. Both the dewlap and the raised arch are easily discernible in very many of my Seladang photographs. One of the most distinguishing features of all Seladang is the presence of a very long and high dorsal ridge. This, with its great depth of body, makes it a most imposing animal. The legs and feet in Seladang seem small in proportion to the rest of their bulk; nevertheless they are all-sufficient to this most powerful beast. When needed they can carry that great bulk at a terrific speed.

Man is probably the most feared beast of all where Seladang are concerned. They abhor his odor. They are only too glad to give him a very wide berth. Yet they take advantage of his industry. It is chiefly due to our primitive people that they are able to enjoy rich grazing which would not otherwise be available. Primitive man with his shifting cultivation fells the forest, grows and takes off his crops, and moves further on to fell again. This leaves abandoned areas which for some years produce luscious fodder for the Seladang before reverting to secondary forest.

In the study of these animals man must be circumspect in his approach. He must avoid his scent reaching them as he must be sure he is unseen and unheard by them. Of course there are times in the jungles when, moving very quietly, he may virtually almost bump into a resting herd or lone animal. If a herd, pandemonium breaks loose as the beasts scatter and stampede away. Seladang while in the cover of forest are far more nervous than when grazing or resting in open clearings. On a number of occasions while quietly walking along a path in the heart of a jungle I have come face to face with old bull Seladang as well as younger ones. This would not have happened had the drift of air been faster than my speed from me to them. There was no variation in their reaction when this happened. The beast stopped short, facing me at anything from ten to twenty paces, threw up his head and stared hard as if puzzled, stamped and even approached a couple of paces. Finally, when he was certain that the still and silent form blocking his path was man, there was an explosive snort before he wheeled suddenly about and crashed away the way he had come.

Seladang while in open clearings and in the glades of salt-licks in the forest are not nearly so wary once they have spent some minutes there. If a herd is present in such a situation some cow will most certainly have her head up. If while she does this sentry duty the faintest tinge of peril is wafted to her nostrils, she becomes doubly wary. Her nose goes out and her nostrils weigh the scent. First to her front and then in other directions. Should she feel that the scent denotes real danger, she will by her action have pin-pointed its direction and she will suddenly wheel away and stampede a short distance before again turning to face the threatening situation. Her behavior brings all members of the herd fully alive to the danger, and they follow her example, forming a loose knot facing the source of any possible onslaught. Only a fraction of time is spent thus before they wheel again and gallop off into the cover of the forest.

Herd bulls do not undertake these watchdog duties but leave them to their wives. The latter naturally are more efficient, for they have all had to be very much upon their toes when they had calves running with them. Nevertheless the bull quickly acts on the danger signal and places himself at the head of his herd when facing danger. He also, like a good commander, generally takes position in the rear during such retirements. Unwounded Seladang, and Seladang cows without very young calves do not, as is popularly believed, charge man on sight. They are only too anxious to get away from him. A wounded Seladang bull or cow, or a cow with a calf that cannot yet move freely, may charge man, however. The cow with such a calf will do so at once if man should approach too close to or stumble upon a hidden calf.

I have only once driven a car in among a herd of Seladang. Their reaction was interesting. So long as I remained in the car the Seladang stood about, but as soon as I got down and separated myself from the car they stood not on the order of their going. So, too, on some of our rivers where outboard motor boats are used frequently, I have passed Seladang standing on the banks within twenty paces of the boat as I roared by.

In 1947, as Game Warden superintending King George V National Park, I was aware that at odd times a herd of Seladang visited the environs of the park headquarters at Kuala Tahan.

They did not then approach closely to the busy settlement there. From time to time until 1950 I observed the herds in various situations to within a quarter of a mile of our settlement, and even closer over the Tahan and Tembeling Rivers. But always it was us who approached them. If we came upon them suddenly, they stampeded away. By approaching stealthily under cover one could get reasonably close to them and make observations, but invariably the click of a camera shutter even at fifty yards would make them positively uneasy. The faintest scent of man at distances under eighty yards would cause them to bunch and bolt to the cover of the forest. If in the forest they bolted deeper into the forest.

It was then I decided I would bring the Seladang to us. It did not take as long as I imagined. The jungle at the back of the settlement had been used for a number of years by all and sundry for the collection of firewood, timber and other building necessities. I closed to man that part of the jungle which lay at the back of the settlement to a depth of two miles. No man, woman or child on pain of instant dismissal has been allowed to enter there since. Within two months of my closing that area Seladang were grazing on the forest edge about one hundred and fifty yards behind my barn home.

They remained in that jungle for some weeks and daily became bolder in their approach to man. A fence sixty yards behind my barn they grazed up to nightly and to within thirty yards of it in broad daylight. Later I moved the fence thirty yards closer to "The Barn." The Seladang at once took advantage of the extra grazing thus provided. Today when the herd are in at Kuala Tahan they may be seen grazing or lying ruminating in the open beyond the fence at any hour of the day, but more usually they appear in the late afternoon and retire to the cover of the forest in the morning before the sun gets too hot for their liking.

The running of engines on the river and in the settlement does not bother them. The screaming of children and the shouting of men likewise bothers them not. The sawing, banging, clanging and hammering that takes place in a normal day's work in the settlement they are now accustomed to and they heed it not at all. To make the beasts of the herd raise their heads to pose for a picture at a range of fifty yards from the observation hide requires a very goodly shout. Even then their heads are soon down to the serious job of filling their maws. This direct shouting at close range should but very seldom be indulged in as too much of it does make them uneasy and inclined to retire. I have seen a party of some twelve gaily clothed persons, at six o'clock of an evening, standing together talking and gesticulating in the open within seventy yards of these Seladang. Yet after a brief survey of the party the herd grazed on undisturbed. But let no man approach them closer than that, directly and in the open,

Primitive people in Malaya clear areas of the forest and then move on, leaving open fields that soon grow up in grass. These "pastures" make attractive grazing grounds for Seladang.

A Sambar Deer has come to a salt-lick glade in forest. Seladang and Sambar often frequent same glades, but do not mix. The call of the serves to warn the Seladang of a nearby T

for though these Seladang will not then stampede they will move towards the forest uneasily.

If one could live completely alone at Kuala Tahan for a number of years with all fences removed, I am convinced one could hand-feed the beasts like domestic cattle. And who knows but in time one might even milk the cows! These Seladang quickly become used to powerful floodlamps shining out on to their grazing ground from the fence line. It was not so long before they grazed even close in to the full glaring beams of these powerful lamps.

Seladang react differently with mammals other than man. Seladang and Sambar Deer may be seen grazing in the same open glade in the forest, but during observations when both were present it was noted that they do not mix. Invariably they feed well apart, though neither seems to have any antipathy towards the other. Sometimes when Seladang are in the open grazing, suddenly it will be observed that the herd have thrown up their heads and are gazing intently at a spot on the forest edge. Perhaps a minute or more later a Sambar Deer steps out and may pass within a few yards of the herd, and perhaps later another and another may appear the same way. They keep to themselves and the Seladang return to their grazing.

The Sambar Deer are of a distinctly more nervous temperament than the Seladang. They have need to be for they are so much more vulnerable to the tiger, being possibly its most favored food. They are forever on their toes, and

literally so. Often through the Sambar's wariness the Seladang are alerted when tigers are nearby; the sudden startling bell of a Sambar in the presence of Seladang brings the whole herd to attention and watchful.

This is clearly shown by an experience I had in 1939 in Krau Game Reserve.

One evening I was approaching the abandoned clearing of an aboriginal tribe. I had with me a young Game Ranger and my friend Begng. Begng belongs to the Che Wong, a little known primitive tribe. His knowledge of life in his forest is very great. As we drew near the clearing's edge a bull Seladang bellowed. We made our approach even more stealthily and arrived at a huge termite nest on the clearing's edge. This termite's nest had sparse coarse grass growing about its base that would not have hidden from view a domestic cat. I halted my companions some paces behind and edged forward to my right to view the clearing better, but could see no animal to my front. As I edged further forward to get a view 'round the anthill, a startled Sambar Deer belled in my right ear and raced away across the clearing.

Startled by the sudden terrific noise I jumped, and a moment later was peering 'round the anthill. There at about forty paces stood a herd of eight Seladang, including a fine old bull. All heads were up and looking in the direction of the startled Sambar. After counting the Seladang several times and making a mind picture of them for my notes, I turned back to signal to my companions. As I raised my hand and beckoned, a tiger rose from a prone position at the base of the anthill and leaped out of sight, giving an angry "ahauh." With nothing but a tiny Malay golok (a small bush knife) in my hand, my reaction does not concern this narrative, but when I was able to collect my wits I turned back to see what the Seladang were doing. They were still there and had moved forward five or six paces in the direction of the tiger's angry voice. In doing so they had bunched, with the bull half a length forward, cows to the right and left while the smaller fry could barely be seen in the knot. I am afraid I was careless; at any rate I was so engrossed that I exposed myself to them and they undoubtedly mistook me for the tiger and approached menacingly but slowly. I was flummoxed and backed slowly into the open. They stopped and glowered malevolently and while I continued my slow walk backwards, still stood their ground (they had not caught my scent, as the wind was from them). I still continued backwards while they remained closely bunched, glaring balefully across the short intervening space; the space widened and eventually I found myself in the cover of the forest. My two companions had already made themselves scarce on seeing the tiger.

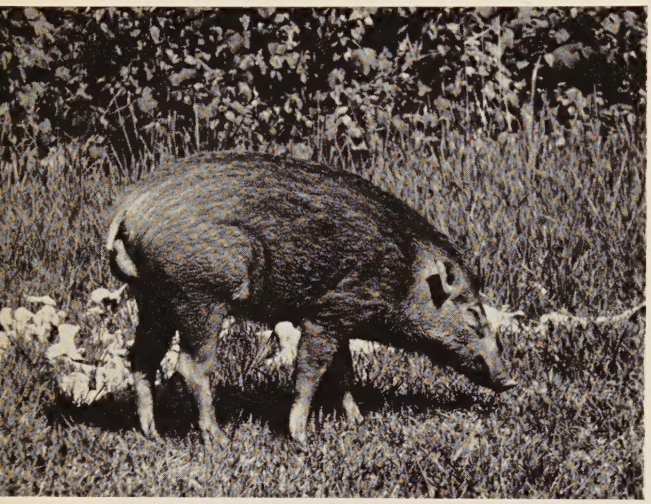
Seladang under normal conditions fear man, and either sound or sight of him is enough to set them on the run. Not so when tigers are concerned; they may fear tiger, but they know their combined strength and are prepared to stand and fight rather than run. The tiger mentioned here would have been shredded had he attacked that knot of angry beasts. In passing, it might be noted how invisible tigers may be. How all three of us failed to notice this one was beyond our understanding. How that beast stayed frozen while I chased away its dinner, the Sambar, walked past its nose, and then came back and stood beside it beckoning, is still beyond my comprehension, but the fact remains. Practically standing on its toes proved the last straw. I was not its meat and the tiger went; but I do think angrily.

Tigers do certainly take a few young Seladang from the herd. Three Seladang calves under a year old were devoured by tiger from the herd in 1953, and at odd times in previous years some older beasts as well as calves have disappeared from the herd when tigers were known to be in the same locality.

Seladang grazing in the open are quick to detect the hidden presence of wild pigs; very much quicker than man, the patient observer. Their reaction is much the same as with the Sambar Deer: heads up and facing one direction towards the forest. Once the pig, or pigs, have appeared, the Seladang return to their preoccupation. On numerous occasions I have observed pigs up to seventeen in number appear like this, and scuttle slowly with brief halts with their snouts to the ground as they passed closely the Seladang herd. Pigs too are extremely wary, for like the Sambar Deer they are a very much favored food of the huge cats. The wild pig is

a very wise animal and all its senses of sight, hearing and smell are highly developed. A startled snort from a pig of a sounder send them all scuttling at high speed. This snort, too, warns Seladang of danger and gives them time to meet it adequately.

Seladang and elephants do not mix in their mutual habitat. Seladang which may have spent some weeks in and about some favored grazing ground or salt-lick are quick to vacate their tenement when elephants push their long noses in. They have little in common. The elephant being the enormous beast it is has little to fear other than man. Thus it is to be expected that Seladang will get no warning shout from them in the presence of a mortal enemy. Though tigers are known at times to attack elephants, their screaming and trumpeting may merely be a domestic family squabble. Seladang mistrusts those who call wolf at all times.



The jungle fowl is surely the Seladang's best friend and the partnership is by no means one-sided, for the Seladang grazing and cropping grass disturbs a wealth of insect life which goes to fill the fowls' crops. It is no uncommon sight

LEFT — A young wild boar beside the skeletal r mains of a Seladang. Even dried bones are gris his mill. BELOW — Wild pigs wallow in a clear They, too, warn Seladang of the approach of dan

to see a number of jungle fowls dashing about under the bellies of the Seladang, stuffing themselves with grasshoppers and other exposed valuable protein foods. Is there any more wary animal than this selfsame jungle fowl? I doubt it. They seem to hear the unhearable and see the unseeable. They needs must to exist in their world with a multitude of cats from the greatest to the least. They are so vulnerable to them all. Our sporting gunman knows their wariness. Our local hunters devise all methods of trap and device for their downfall, yet still their name is legion. Very often the first one knows of the presence of jungle fowl is a whirr of wings as they take off unseen. That sudden whirr of wings brings sleeping Seladang to their feet and wide awake; but let me continue some of their story from my nature notes.

1954, February: — Our heard of Seladang which I knew to be across the Tahan for some reason did not cross over to the grassy clearing behind my dwelling as is their usual habit. I believed this was caused by the presence in our settlement of Yatimah Puteh, our baby elephant, which at times was very loud-mouthed. Seladang and elephants do not generally mix. However, in this instance I was to prove wrong in my conclusion.

1954, March 4th: — Our herd of Seladang at 5:30 p.m. appeared behind my barn. A bright red calf, just a month old, was with them. It was only then that the true reason dawned on me why they had not returned before. I should have thought of it instead of blaming our baby elephant. I have known for years that when a Seladang calf is born the herd will never desert the dam and calf. They hang together until such time as the calf is old enough to move very freely and if necessary swim across a goodly river. This period is always a full month. I have remarked this often when calves have been born on our settlement side of the rivers. Nevertheless I am still aware that Seladang prefer their own company to that of elephants.

1954, March 5th: — Seladang out in force at 6 p.m. The herd of eleven head (old Curly Horn, the dam of several pairs of twins, is missing) came within thirty yards of my observation hide. The cow with the nasty gaping wound in the base of her horn is still much bothered by her affliction: shaking her head and clawing in the wound with her off hind hoof, then licking the hoof so used. The month-old calf, a baby bull, is very frisky. He is named today "Red Coat," for he is redder than most at his age. While I sat watching the herd young Yatimah Puteh, our baby elephant, gave loud voice not far away. Every Seladang including Red Coat threw up its head, listened for some twenty seconds, then went on grazing. This was repeated some few minutes later but with little effect on the Seladang. They now obviously accepted Yatimah Puteh as of no more consequence than the rest of us at Kuala Tahan.

1954, March 6th to 10th: — Seladang observed grazing each day morning and evening.

1954, March 11th: — At 4:45 p.m. the herd was in. I entered the observation hide and sat and watched them. The calf, Red Coat, was suckled in the normal manner of domestic cattle for a full eight minutes by his dam. I have also observed Seladang calves suckled from behind in the way of domestic water-buffalo. With the herd were eight jungle fowl: three adult cocks, four adult hens and a well grown cockerel. They strutted around enjoying the insect life disturbed by the grazing Seladang. It was interesting to note how carefully the herd bull, Thin Horn, avoided putting his great hooves down on top of the cockerel. Once or twice he deliberately avoided doing so. Soon Thin Horn slumped down and lay chewing the cud near Sore Horn, who lay dozing with eyes closed. The perky young cockerel, who had been fussing about the bull, left him and strutted over to Sore Horn. There he hopped up on her dorsal ridge and thence to the arch between her horns. Sore Horn never moved and Dr. Cockerel at once proceeded to operate on the gaping wound in the base of her right horn. He spent three full minutes cleaning out the wound, during which time he must have removed a score of maggots, besides dead tissue. The operation successfully completed, like any other surgeon he left the operating table and dropped back to earth, there to strut off on his usual rounds. Sore Horn during the whole ordeal never moved, winced nor opened an eye. However, when the doctor was safely clear of the operating theatre, she opened her eyes, shook her head, rose to her feet and walked

The cow nicknamed Sorehorn is at the extreme right and the tiny object at the head of the arrow is her "surgeon," the Jungle Fowl cockerel which used to clean out her injured horn.

a hundred yards to a sapling on the forest fringe. There against the sapling she gave her head in the region of her wound a thorough rubbing, then back to the herd to fill her maw. The cow is still, after many months, suffering from her wound (I fear caused by a poacher's bullet fired on the herd's wandering outside the Park on the other side of the Tembeling River) but retains wonderful condition. Her mantle is a rich glossy dark bay and her muscles are full; so, too, is her torso and I expect soon to see another young calf with the herd.

1954, March 12th to 20th: — Seladang grazed daily in our home clearing.

1954, March 21st: — At 5:00 p.m. entered my observation hide. Only ten head of Seladang were out cropping grass or lying chewing their cuds. Dr. Cockerel, two adult cocks and a hen jungle fowl were in attendance and gorging themselves on the plentiful insect life. Later the doctor got round to his patient, Sore Horn, and what followed was worth waiting years to observe. Sore Horn was stretched out on the grass ruminating. As the doctor approached her she stopped chewing her cud and as he drew quite close she thrust out her chin, laying her chin and throat pressed to the ground. That was not all: she then tilted her sick horn over towards the ground also. The doctor apparently appreciated not having to climb on to the operating table and forthwith set to, to clean her ugly wound. He did it as thoroughly as on the former occasion, then strutted off to join his companions. Sore Horn did not get up, just shook her head and continued chewing her cud where she had left off. Her whole action during the approach of the cockerel and her placid demeanor during the

cleaning of her wound indicates intelligence in a Seladang far beyond any I had previously credited the species with. It was hardly to be expected from these supposedly heavy-witted, dull, sluggish-brained animals.

1954, March 22nd: — The Seladang herd were out by 4:00 p.m. in the home clearing. A wild sow with well grown piglets led by a fair sized boar scuttled across the clearing between the hide and the Seladang. Neither took the slightest notice of the other. The Seladang, as usual, had attracted my attention to the pigs' approach long before I would otherwise have become aware of their presence, but long before they had arrived anywhere near, the herd had recognised them for what they were and gave them no further thought on their close approach.

1954, March 23rd: — 6:00 p.m.—Seladang in force out grazing in home clearing. A Malay schoolmaster with three companions on their duty way to Ulu Tembeling saw Seladang for the first time in their lives. It is an unintelligible fact to me that these men of Malaya, Malays all of them, had never until now seen one of their own grand forest cattle. Do our schools teach nothing other than the three R's? It would seem not. What a pity.

1954, March 24th: — Seladang were at the salt hole in home clearing at 5:30 p.m. As I was about to enter the hide a cow, Bull Head, always a nervous beast, though the most magnificent of her sex, was screened from me only by the thickness of the palm-leaf-draped fence. As we, unknown to each other, stood shoulder to shoulder she must have got my stench. Any-

These magnificent beasts are part of the herd that came regularly to the abandoned clearing in the King George V National Park in Malaya. The herd bull, Thinhorn, is at the lower left.

way, there was a minor atomic explosion close to my right ear, and taken unaware by the blast I had the wits scared out of me. She stampeded away to rejoin the herd, which also withdrew hurriedly some twenty paces. There they wheeled and stood in a loose knot glowering in my direction. Fortunately I have a loose skin, or surely I would have burst out of it at the detonation. It took me just as long as I am sure it did her to stop the pounding of my heart and regain normal equilibrium. All the animals were obviously alarmed but not unduly so. The herd bull gave a couple of low-throated roars, short but convincing of his intentions in any event. They stood thus loosely bunched for a while, but after a short minute they grazed apart and did not approach the salt hole again till near dark. One after another heads went down when they were convinced it was only a storm in a teacup. Bull Head remained very watchful for another two minutes. Then she, too, seemed to get over her fright and started grazing. Had this episode taken place in some old clearing far away from human habitation, deep in the forest, those Seladang would at once have stampeded away from the clearing to some great distance into the forest. They would certainly not have returned to the place for days, perhaps weeks or even months.

1954, March 25th: — From 5 to 6 p.m. I watched the eleven head of Seladang from a comfortable chair in home hide. A small cow, Blackstripe, the first born of Bull Head, was paying much attention to the herd bull, Thin Horn. He, looking quite bored, permitted himself to be thoroughly groomed about the face, ears and shoulders. When he had stood as much as he could take of this obvious courting, he slumped down where he stood and with his back to the young cow chewed his cud. I do think that young thing had every right to feel slighted. Dr. Cockerel and another very lovely jungle cock were there. Young Red Coat frisked about from time to time, then tiring of his play lay down and curled up. Had I not seen this young calf lie down I would never have spotted him. Though his coat is bright red and the grass all around quite green, there is something about the tones that make the detection of a calf at this stage impossible unless it moves. So it was with this one. I could not have pointed him out to anyone who might have arrived on the scene then. The doctor strutted over in his professionally perky manner and inspected Sore Horn's wound as her head was down cropping the grass. He did not operate. Obviously he considered his patient was doing very well, and doubtless patted himself on the back as he minced away. It appeared like that, for he flapped his wings and gave a feeble crow.

March 26th: — Seladang are still at Kuala Tahan.

March 27th: — I watched the Seladang out in force from Home Hide from 4 to 6 p.m. Took some pictures of them on Kodachrome. One of these should show Red Coat in a patch of sunlight. A single fine jungle cock fussed among the herd.

March 28th: — Seladang out in force morning and evening.

March 29th: — Watched Seladang herd from Home Hide from 4 to 6 p.m. Two jungle cocks were there, Dr. Cockerel one of them, but he paid no attention to his patient. It appears that she is only an out-patient now and probably has to queue with the crowd before she gets the attention of one less expert than her famous surgeon. A jungle hen joined the gathering just before I left them.

March 30th: — In very heavy rain the Seladang were at the salt hole in the home clearing at 3:30 p.m., and later came very close to the hide. During these very heavy rain squalls Seladang sometimes behave in an extraordinary manner. At such times they bunch, then break and scatter in all directions, becoming very skittish, from the youngest calf to the most sedate old cow. Even the ponderous great herd bull will then come suddenly to life and playfully mount a number of cows one after another. All will leap around flinging their hind heels high in the air. This even scares the jungle fowl, who take to wing for safety among so much madness.

March 31st: — Seladang lay ruminating in the home clearing until 7:30 a.m., when they retired to the cover of the forest. They did not reappear again this evening.*

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* Grateful acknowledgement is made to the Malayan Nature Society for permission to use some of my notes published in Vol. 9, pages 1-10, of the *Malayan Nature Journal*, June, 1954.

This is a pair of the Lake Peten Mollie. Only fully adult males have the enormous, sail-like fin. The fish reaches a length of about five inches, making it one of the largest of the Mollies. First brought to this country in 1935, they were reintroduced by the Aquarium in 1954.

LAKE PETÉN MOLLIES AGAIN

By MYRON GORDON

THE Lake Petén Mollie, a giant fish by tropical aquarium fish fanciers' standards but one that would be rated only as a good-sized minnow by game fish enthusiasts, was found in Guatemala, brought back alive to the Zoological Society's Aquarium and displayed there for the first time during the summer of 1954. Little was known about this beautiful, five-inch-long live-bearing fish except that it was one of the largest of its kind, it had an enormous, cape-like top fin and its home territory was restricted to Lake Petén and vicinity in the north-central part of Guatemala.

When I went to Guatemala and adjoining British Honduras last year, I was not primarily concerned with Mollies. The purpose of the Aquarium's expedition was to obtain new and

rare races of platyfishes for our long-term experiments designed to understand better the influence of heredity in the development of black cancers. On the night preceding the date set for the first day's survey of the Lake Petén area, my guides, Señor Pinelo, the agent for the local airline at Flores, and my host Señor Castellaños, suggested a fish hunt by flashlight in the shallow waters along the lake shore.

When the spotlight was flashed in the water between the beached native dug-out canoes, I noticed a number of pale gray, ghost-like, fish-like objects. At first they were practically motionless; then gradually they began to stir in the glare of the persistent light and their shadows revealed their outlines. As they swam closer to the shore, I saw their high, sail-like fins which broke through the surface of the murky water. I realized at that instant that the fish were *Mollienisia petenensis,* a rare species only once before seen alive for a short time in the United States. I decided there and then I had to make every effort to get some of them back alive for the Society's Aquarium even though my equipment was not designed to carry fish of the Petén Mollies' generous proportions.

I would not have succeeded had it not been for the interest and help of Señors Pinelo and Castellaños in Flores, and three extraordinary persons in Guatemala City, Señor Penado, Dr. Scrimshaw and Señora Bower. With their enthusiastic cooperation, the Petén Mollies, upon their arrival in Guatemala City, were instantly transplanted into large aquaria made available especially for them and the platyfishes. The Mollies responded graciously by giving birth to a large brood of young. This unexpected bonanza facilitated my problem of how I could, in some measure, repay my friends for their kindnesses. Before returning home, I divided the lot of baby Mollies among them. The unusual fact about these babies is that ordinarily gravid Mollies, if disturbed, are not supposed to give birth to viable young. Although the Petén Mollies were carefully handled, they were nevertheless uprooted from their home and shut up in small glass jars for several days. Despite my best efforts they were jolted badly in their journey from their Lake Petén jungle home to what turned out to be their Guatemala City maternity ward. Two females and their handsome male reached New York City safely and continued their laudable family behavior. In our aquaria, they produced many more young, some of which were donated to British aquarists; others were given to Dr. Caryl P. Haskins who is studying their responses to related Mollies.

Mollies of one kind or another live just about in every sluggish stream and weed-entangled pool along the Atlantic coastal plain from Florida to Texas down to Mexico, the countries of Central America, Panama, Colombia and Venezuela. They are not of the same species. Neither are they radically different from one another. The aquarist can recognize the distinctive characters of a Mollie no matter where it comes from. So can the Mollies. When two Mollies from widely geographically isolated countries are brought together through the intervention of a fish fancier, the fishes respond favorably and usually interbreed. As a consequence, if the fancier takes no precautions to maintain the original natural population in separate quarters the purity of each race is threatened. The Mollies' lack of discrimination and the fancier's carelessness led to the loss of the first lot of Giant Mollies from Petén. It happened in 1935.

At that time a few Mollies from Petén were brought back alive to the United States by Dr. Carl L. Hubbs on an expedition sponsored by the University of Michigan's Museum of Zoology. They required generous living quarters for breeding and the rearing of the young. They were liberated in a pond of a commercial tropical fish breeder in Louisiana. The manager, unfortunately, failed to remove the native Louisiana Mollie, *latipinna,* from their pond. The two species interbred and the original *petenensis* was never recovered. That is, until the Society's own expedition to Lake Petén, early last year.

In our large aquaria, the spectacular Petén Mollie male was constantly displaying his enormous blue and green star-spangled top fin. He would rush out of a corner, stop short before his mate, twist his body and curve his net-like fin as if to trap her. There should have been a dozen females for him for he was entirely too energetic for the two. A glass barrier had to be placed between them, to protect them. I could not help but think that he behaved like a pugnacious rooster in a hen yard.

PICTURE NEWS FROM THE ZOO

Photographs by SAM DUNTON

As nearly as we can discover, no Callimico had been exhibited in this country until this specimen came from Peru. (Story on p. 29).

Solemn Tawny Frogmouths, closely resembling in color and markings the bark of a tree, are new arrivals from Sydney Zoo.

A pair of young Masai Giraffes is now on exhibition — first of this form in sixteen years.

The South African Horned Viper, a desert snake, typically lies partly buried in the loose sand.

The
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hly-scaled tail witching motion is on the prowl.

"Horns" of the viper are formed by single scales over the eyes. The reptile has a potent venom.

As far as we know, these are the first Silver Hatchet Fish (Thoracocharax securis) ever exhibited. They are true flying fish of the fresh waters and were collected last year probably in the Amazon basin.

These Red-backed Saki Monkeys were quite young on arrival from French Guiana in 1953. They are adult now — the first we have exhibited — and the male has developed an enormous, thick "beard."

ALL ON THE THEME OF CONSERVATION

By STEPHEN W. BERGEN

Assistant, Research Division, The Conservation Foundation

THE ROLE OF SCIENCE is more and more a key one in resource management. Without science the fantastic scale and intensity by which this country exploits its resources would clearly be impossible. But this highly intensive use brings new problems in its wake, especially as we continue to demand ever higher levels of living. The challenge to science thus becomes even greater, given the complex ways in which an industrial society comes to depend on its resources. For resources are naturally interdependent, both physically and in an economic sense, and using one of them affects the availability of another. The use of the land, for instance, affects water supply; and pollution of water by industry affects municipal supplies, and vice versa. This theme of the interdependence of resources often appears in the research studies that the Conservation Foundation has sponsored.

Six books and three reports on resources have been published since 1948. These studies have unusual features as well as an interesting history. They have come out of research which an independent organization in this field is peculiarly fitted to undertake. And in common they embody an attitude — a point of view about the country's resources — that comes to those who work in science and who endeavor to apply it to social questions. Essentially this attitude is that if a high-paced industrial nation wants to use its resources well, it must draw steadily upon scientific understanding of resource problems. It is the spreading of this understanding at which our books aim.

That we must look to science may be obvious to the reader. Yet it may surprise him to discover how little is actually known about some resources that have been used since time out of mind. Parts of our studies, in fact, recommending investigations which should be pursued, read like almanacs of ignorance.

This is another theme illustrated in these research reports: that ignorance still prevents efficient use and conservation; resources are used badly because we do not yet know how to do better. And further that, if the knowledge exists, it is often not, for one reason or another, put into practice.

Hence the germ of many of our research studies was a question, or series of questions, about the state of knowledge in a particular field and its present degree of application. In several instances a project essentially entailed bringing the findings of many sciences to bear on a specific practical problem, such as the study of flood control methods and policies.

No fewer than five of the Foundation's studies deal with some aspect of water supply and development. Over the last decade or so there has been a great permanent increase in the nation's over-all water needs, and many existing water supply measures and facilities are proving to be extremely inadequate.

Our first water project surveyed the present ground-water situation in the United States and brought together from many sources information on ground-water use over the country, thus making generally available the experience gained and management practices applied in various areas. The study was successfully published commercially as "The Conservation of Ground Water," and a number of universities are now using it as a text. Its value lies in its broad, nationwide appraisal of where we stand with respect to this

These books and pamphlets have come out of research fostered by the Conservation Foundation since 1948, and are widely distributed.

water source and in its specific recommendations for further development and research.

"Vegetation and Watershed Management" is the title of our second book dealing with water. "Managing" the vegetation of forest and wild lands and of croplands, specifically to improve the way water comes off the land, is a promising method of water control and erosion prevention. But experience is limited, and many aspects that are now controversial require much more research. This book places present knowledge of vegetation management in perspective by showing what else must be learned before particular methods can be widely applied.

In these two studies we were advised by special committees of scientists from universities and from governmental agencies, in order to have the benefit of varying backgrounds and viewpoints. This is one advantage of the independent organization in the resource field — that it may readily bring together specialists in several disciplines.

A third book, "Fresh Water from the Ocean," is a technical evaluation of the possibility of purifying sea water on a large scale at low cost. The great benefits a successful cheap method would bring to the world's arid areas continue to stimulate work and discussion. This systematic examination of the basic physics of the conversion problem is designed to encourage further fruitful research.

Only since World War II are industrial water needs and use beginning to get attention on a scale their magnitude and complexity demand. In 1950 our staff cooperated with the National Association of Manufacturers in a broad survey of the use of water in 3,000 representative industrial plants. This study, published as "Water in Industry," has had a large industrial distribution and has been widely used by engineers and planning agencies.

Our most recent project concerned with water resources deals with the nation's flood control programs and policies and analyzes current con-

troversial questions in this field. Carried out with the cooperation of the U. S. Department of Agriculture and the Corps of Engineers, U. S. Army, "The Flood Control Controversy" is the only description generally available of how Federal flood control measures are justified and planned. It summarizes the relative merits — and limitations — of both big and small dams, and also how much and when land management may control flooding. There is a continuing demand for flood control work in many parts of the country. This book may well have a strong influence in clarifying for the general public the nature of the problem and the methods available to deal with it.

The major study in wildlife conservation so far sponsored by the Foundation is "Wildlife in Alaska," the record of an extended journey of observation in the Territory in the summer of 1952. This was "an ecological reconnaissance" which covered especially Alaska's invaluable wildlife resources — particularly Caribou, Moose and Reindeer. The impact of human settlement on wildlife habitats is analyzed and set against the work and research still to be done to secure sound management of these animal resources, which are of key importance to many who live in Alaska. Various Federal and Territorial agencies aided the authors in the field; the study was sponsored jointly with the New York Zoological Society and the University of Alaska.

"Forests for the Future" summarizes varying controversial interpretations of the national forest situation. At present there is strong disagreement on two major issues: the *rate* at which the forests of the United States are being depleted, and the wisdom of proposals that have been made for governmental regulations to check depletion and increase productivity. This pamphlet is designed to increase public understanding of the problems confronting the makers of policy at this stage in American forestry, by presenting the views of different groups along with the facts with which all agree.

Laws, as well as the current state of science, affect the way resources are used. "Conservation Law and Administration" is a case study of law and resource use in the State of Pennsylvania, and surveys the statutes and administrative agencies and practices that regulate or influence resource utilization in the Commonwealth. It was carried out by the Law School of the University of Pittsburgh. The specific resources covered are fish and game, water, forests, recreation areas and agricultural land, and there is also a section on conservation education. Because of its complex association of industry, commerce and agriculture, Pennsylvania is an ideal laboratory for the study of the legal and governmental questions arising from efforts to achieve the intelligent use of resources. Hence this book should prove extremely useful to residents of other States as well. It includes a draft of model State legislation for efficient and integrated administration of renewable resources.

Our most recent research publication, sponsored jointly by the Foundation and the Food and Agriculture Organization of the United Nations, is a regional map-survey called "Soil Erosion Survey of Latin America." Three maps, covering the Americas south of the Rio Grande on a scale of 1:10,000,000, with trilingual legends, are accompanied by a descriptive text that emphasizes the causes of erosion in the several countries. Remedial measures — technical, economic and administrative — are also suggested. We are arranging for wide distribution of this study to key persons in science, government, and universities in the countries concerned, in the hope that it will assist in plans for coping with this major problem.

For all these books and pamphlet reports we have had very much in mind the need to promote them actively — to make sure that they are put to use. Plans for reaching the potential market in each case are laid at the same time as research begins. Upon publication, scientists at universities and in industry, members of professional societies and other groups are informed of the bearing of each report on present resource questions. Naturally many of the intimate connections our organization has established with these persons and organizations stand us in good stead in this highly essential promotional work.

The distribution of our publications to date has been very gratifying. More important, perhaps, is the fact that they are gaining a reputation for objectivity and realism — not a small achievement in a field charged with emotion, dogmatic attitudes and politics.

The Adaptable Wren

By EDWARD A. ARMSTRONG

Author of Bird Display, Birds of the Grey Wind, Bird Display & Behaviour, etc.

A European Wren has just alighted on a tangle of vines in which its nest has been built. The chick's open mouth is beyond the Wren's beak.

All photographs by the Author

THERE CAN BE FEW BIRDS more fascinating than the diminutive Wren – the Winter Wren, as it is called in North America. Almost every aspect of its behavior is peculiar. It is not surprising that in Europe this tiny bird has been the central figure in fables and odd ceremonies from time immemorial. If the story of the Wren outwitting and outflying the eagle is pure fiction, it is sober fact that Wrens flew to islands, such as the Pribilofs and Formosa, and established themselves there.

Not very long ago as time is reckoned by geologists, the pioneers of the species crossed a land-bridge at Bering Strait and their descendants wandered right across the temperate regions of Asia to the westernmost islands of Europe. I have found Wrens in Irish woods, on the slopes of snow-topped mountains in Iceland and in Algerian ravines. One of my most vivid memories is of Wren songs ringing out at misty daybreak as our small boat lay off the cliffs of St. Kilda, fifty miles out in the Atlantic. The bright chorus provided the clue we needed, for we knew it must come from where Wrens are numerous in the deserted village, near which was the only place a boat could put in safely.

Here, and on other island groups around the British coast – and indeed also on the islands of the North Pacific – Wrens have been established sufficiently long to have developed characteristics entitling them to be ranked as subspecies. Going south in America we find many different kinds of Wrens, especially when we reach the tropics, and we may therefore assume that in this area the family originated, and from it the birds spread, becoming modified in the course of many centuries as they adapted themselves to different types of environment. The Wren has not colonized the tropics, but it has girdled the globe.

Far from being a disadvantage, the Wren's small size aided its invasion of Europe and Asia, for in these continents there was no species already established which could, like the Wren, find food by creeping into very thick undergrowth and tiny crevices. Nor does its tinyness prevent its making great journeys. Although only in the most northerly areas of its range does the Wren migrate regularly, yet, even where it is resident all year 'round, individuals may make immense journeys. For example, a bird ringed on

an island in the Baltic was recovered in northern Italy.

In Europe, and even more in North America, where the Wren, unable to compete with the House Wren for niches near houses, keeps mainly to the woods, it is more frequently heard than seen. Lord Grey told an apt anecdote of a schoolboy who complained that he was interrupted in doing his lessons by "that shattering Wren." This powerful and persistent song is uttered by the male to warn off rivals from his comparatively large territory and to attract females. As we shall see, he may induce more than one to join him.

As if to offset the lack of brilliant adornments with which some birds are endowed, and which they use to defy other males or to impress females, Wrens have evolved song into a highly expressive language. The cock can alter his customary phrase to a strident, congested version, when challenging an intruder, but when wooing a female he modifies his song to a subdued, sweet trickle of sound. On hearing this melodious warbling one is inclined to murmur, with Shakespeare, "How silver-sweet sound lovers' tongues." It is easy to tell when a female has entered a male's domain, for if you hear this soft strain as you approach, you may confidently infer that the Wrens are courting.

The female is coy and quiet, creeping mouse-like amidst the herbage, and she utters a song in keeping with her shy ways. It is audible no more than a few yards away. Occasionally she engages in this soft twittering as she sits on the eggs, but more often she sings her shadow-song when she is concerned about her family. She may whisper it when she arrives with a tidbit at the nest, apparently to attract the chicks' attention, or when feeding them after they have fledged. Once I watched a female leading her family from the nest. She crept up a sloping, ivy-wreathed bough, twittering her simple ditty, and after her, in single file, came hopping along her six youngsters. The little procession reminded me of the Seven Dwarfs in Walt Disney's film. Even more delightful scenes occur when the youngsters are being put to bed. They are led to another nest, sometimes one of the male's auxiliary nests, but often the open nest of some other bird, and one by one, after fussing around and some show of reluctance on the part of the chicks, they hop in. When they are all safely ensconced their mother emerges and, perching for a few moments on a twig close to the dormitory, contentedly sings her subdued lullaby. Then she goes off to feed and seek her lonely roost elsewhere in the wood. I have roamed jungles in Asia and Central America without seeing a prettier sight.

In nest-building craftsmanship the Wren is an expert and is able to adapt his behavior to circumstances to a remarkable degree. Few birds build in more varied sites. I have seen nests 30 feet high in trees and others in the ground. On treeless islands the Wren is content with nooks under overhanging turf or crevices in high cliffs.

If moss and leaves are lacking the Wren can "make do" with other building materials – dry grass or even seaweed. There is a record of a nest built of Emu feathers – where these birds were kept in a paddock in England. So cunningly are the pieces of material compacted that some naturalists have suggested that the Wren sticks them together with saliva. The fact is that the bird builds with damp material which bonds as it dries. Knowledge of this peculiarity makes the difficult task of finding Wrens' nests easier. I have often said to myself, "Here's a wet day. I'll go and see where the Wrens are building." As Wrens may construct up to a dozen nests in a season, many of them well concealed, this clue is useful. Very few other European birds build covered nests of vegetable material and there is evidence that the ancestors of some of them, like the Wren's ancestors, came from the tropics.

How are we to explain the Wren's expenditure of energy in making so many nests? Probably only about half of them ever contain eggs. These "cock's nests" are called "play-nests" in Germany, and for many years it was supposed that they were useless. The reverse is true. They have a function in the mating affairs of the Wren and are used as dormitories by the fledged young. At any season of the year adults may roost in them

A typical haunt of the Shetland Wren. Food is relatively scarce here, and the males are mainly monogamous, helping in feeding.

The Shetland Wren itself – a trim, tiny creature notable for its stout legs and bill. This form is confined to the Shetlands.

but in winter their principal use is as communal refuges during bad weather.

Normally the male builds and shows his handiwork to any female who joins him. The procedure is very interesting. Finding a stranger on his beat the male sings and displays; thereupon another male sings in reply or retreats, but a female makes herself known as such by being coy. Now he dances attendance on her, singing soft, melodious snatches, vibrating his drooped wings and, occasionally, chasing and pouncing playfully on her. One morning, if you are fortunate, you may see him singing excitedly as he goes from perch to perch while she follows diffidently. When he arrives at the nest he stands on a twig before the entrance, singing his sweetest love-lilts, and quivering his wings like a brown cloak around him. Suddenly he darts into the nest, thus indicating where the aperture is to be found. He soon reappears, continuing to sing and display while his inamorata creeps closer, seemingly interested only in the spiders and insects in the undergrowth but actually alert to all that is happening. She teeters to the entrance, cranes her neck to peep in – and hops inside to inspect the accommodation. The male, unable to contain his excitement, may also go in and show her around. If, after she has viewed the prospective dwelling, no defect is apparent, she lines it with feathers.

There can be no doubt that the efficiency and vigor of the male are important in enabling him to secure mates. After installing a partner in a nest a cock Wren continues endeavoring to attract other females. Thus, if one or two nests are already occupied an uxorious male needs to have at least one other available for vacant possession, should another female be induced to join him.

But are polygamous males more successful than those which secure but one mate? If a female is left to do all the work while her mate is seeking or courting other females, only about half as much food is brought to the nest as when the

male helps; and if, in consequence, some of the nestlings die or fledge in an under-nourished condition, the more domesticated, monogamous males might leave more sturdy progeny to bring up families in their turn than the polygamists.

The Wren solves this problem in a remarkable way. Where food is relatively scarce, as on bleak islands such as Shetland and St. Kilda, the males are mainly monogamous and help to feed the nestlings. In areas such as southern England, where prey is more abundant, a single Wren can bring up five or six young unaided. Here polygamy is commonest. Parallels may be found in human society! In communities among which polygamy is approved it is usually most prevalent among the wealthier classes.

Thus Wrens' marriage relations are adjusted to the character of their surroundings. But adaptation goes still further. In spite of his polygamous tendencies the cock may, if necessary, help to bring up the brood, and will even undertake entire care of the nestlings from about the age of a week. If a female is killed or deserts the family a male's behavior may undergo an extraordinary transformation. Instead of paying a casual visit to the nest now and then he works furiously — and thus may save the situation. To all outward appearances he becomes a female — no longer singing, courting or nest-building, but concentrating entirely on ministering to the needs of the family.

How exactly is this change brought about? To imagine that a bird can realize that disaster will befall the family unless it works particularly hard is to attribute to it human modes of thought. There is no need to suppose that a Wren can foresee the future in this way. The male's additional efforts in a crisis may be explained quite simply. Nestlings which are not receiving sufficient food, call and beg with accentuated vehemence. This stimulates the parent to work harder. Thus the demands of the young bring about an increased supply.

Actually, of course, the rate at which the nestlings are fed is not simply a matter of supply and demand. It is closely bound up with the vigor of the parent. If detailed observations are made of the tempo of visits to the nest with food, we find that about every four hours during the working day a Wren is particularly diligent. Then the rate of visits falls off for about two hours, when it again begins to increase. It seems that the bird is so constituted that its output of energy waxes and wanes according to a "short-wave" rhythm.

Among Wrens adaptability is not confined to one sex. Not only may the male adopt the role of the female but the female may behave like a male, to the extent that she may help to build nests. The female may even work harder than her mate on nest-construction. I have seen a cock Wren so bewildered by his mate's energetic nest-building that he often dropped the materials he brought and went off muttering disjointed snatches of song.

Thus we have the interesting situation that, although among Wrens more than many other species, each sex tends to specialize in certain activities connected with breeding, yet, in cases of necessity, either sex can undertake some of the duties of the other. Such adaptability must have been of immense value to the species during its invasion of Asia and Europe.

When winter comes the Wren's song and nest serve other purposes than in spring. Instead of being a proclamation of defiance and an invitation to unattached females, the Wren's song becomes an assembly call. At dusk on frosty evenings calls and songs are heard in the woods and little parties of Wrens may be seen searching for a snug roost. Probably males take it in turn to lead the way to nests in which families were not reared in spring, or to other suitable nooks. The nests occupied by families are usually too dilapidated by the autumn to be used as dormitories and the auxiliary nests offer comfortable quarters. If severe weather prevails for a long time the number of Wrens may increase nightly until accommodation is taxed to the utmost. More than forty Wrens have been found crowded tightly into a nesting-box. While the snow drifts softly down on the branches outside or the gale screams through the trees, the Wrens crouch in gently heaving layers on top of one another. So at least some of them manage to survive until milder weather prevails. Then the cheerful songs are heard once more and, with tails cocked over their backs, they shout defiance far and wide — delighting all who take pleasure in the queer ways of little birds.

Gecko
THE CHIRPING REPTILE

By JAMES A. OLIVER

The Tokay Gecko of the Indo-Malayan region. It reaches a lengh of about 13 inches; ours is a nine-inch specimen. The alert pose is typical.

REPTILES AS A GROUP are relatively quiet, seldom given to disturbing the peace with raucous vocalizations. This statement is true for the group as a whole, although exceptions come readily to mind. The rattling of rattlesnakes and the hissing of many reptiles can scarcely be included among the exceptions since they are relatively subdued sounds made only when the animal is excited. Turtles do little more than wheeze, hiss or give vent to somewhat prolonged grunts. The bellowing of crocodilians, particularly that of the Alligator, is a forceful and well-founded exception, as is the croaking cry of the Tuatara. To inhabitants of the warm tropical and subtropical regions, geckos are well-known reptilian vocalists — loudly proclaimed exceptions to our introductory generalization.

Even the name of this group of lizards is based on an effort to imitate the outbursts of one species. The term "gecko" is applied as a general designation for all lizards of the family Gekkonidae. This is an ancient, widely distributed, structurally diverse and fascinating group of reptiles. The family has representatives on all continents except Antarctica and on most islands of the warm seas. An estimated 700 species make up the family, and they range in size from two inches to more than a foot in total length. The most trenchant attributes of the family are skeletal, but two external characters common to virtually all of the species are expanded fingers and toes and elliptical pupils in the eyes.

Details of the under side of the hind foot of the Tokay Gecko, showing the broad scales, or lamellae, and the claws. Both the scales and the claws aid in climbing on smooth surfaces.

The digits are expanded in different fashion in the various groups. In some the entire digit is expanded, in others only the basal portion or only the tip may be enlarged. The broad scales, called lamellae, on the under surface of the digits are either divided into pairs or are single. The expanded areas serve as adhesive organs that enable geckos to climb smooth surfaces with ease – even to scamper across the ceiling of a house. Originally it was believed that the digits functioned like suction cups. However, the detailed studies of Beni Charan Mahendra and others have shown that suction plays no part in the function of the digits. Most geckos have claws at the end of the digits and these are extremely thin and sharply pointed. The exposed surface of each lamella is made up of a vast number of microscopic projections that are recurved at the tip. The claws and the minute projections are inserted into minute irregularities of the surface on which the animal is walking. By a process of interlocking of the tiny projections, the foot adheres securely to the surface. With such secure footing geckos race up walls, window panes and other seemingly smooth surfaces. A few species are ground dwellers and lack expanded digits and are sometimes clawless.

Most geckos are nocturnal in habits, becoming active around dusk and continuing their capers during the hours of darkness. The elliptical pupil of the eye is a structure commonly found in nocturnal animals. Actually it is an effective device for protecting the internal light-sensitive cells of the retina from bright daylight. At night when there is little light the pupil expands, becoming much enlarged and nearly circular. Under these conditions the eye is able to record objects seen in very dim light. If a bright light is shined on the eye at this time, the pupil quickly contracts to prevent the strong light from falling on the retina. Staff Photographer Dunton's excellent photographs accompanying this article show the pupil of a large Tokay Gecko in bright light and as it appears in darkness. The latter condition was photographed by means of infra-red light and shows the angular outline of the expanded pupil.

To return to the vocal attributes of geckos, many species have loud, sharp, chirping or clucking calls, some of which can be heard for a distance of a hundred yards. The calls play a part in the social life of these lizards, aiding them in maintaining territorial limits, in courtship activities and in warning intruders or enemies. The calls of different species vary considerably and often serve as a basis for the common name. Thus the largest of the geckos is called the Tokay Gecko because it has a call variously described as "tokay," "tuk-kaa" or "tuck-too." Malcolm Smith, an outstanding British herpetologist who has contributed so greatly to our knowledge of Indo-Australian reptiles, writes of the Tokay as follows:

"Each call consists of a preliminary cackle, then the sound 'tuk-kaa' repeated deliberately and distinctly several times, finally capped by a low gurgle. The calling is not continued throughout the whole year. It commences about the middle of cool weather (December), becomes more frequent as the hot weather approaches, and is at its maximum during March, April and May.

During these months they can be heard calling frequently, sometimes all through the night, one lizard after another taking up the cry from house to house. After these months they call less frequently, and during the autumn are usually silent."

This gecko attains a maximum length of 13 inches or more and occurs from India eastward through the East Indies and the Malay region to southern China and Indo-China. A handsomely colored nine-inch adult in our reptile collection is shown in the accompanying photograph. When disturbed, this gecko opens its mouth widely, rushes at the intruder and makes an explosive rolling cluck. Its powerful jaws and sharp teeth are capable of inflicting a painful but not serious bite.

Because they feed chiefly on insects, these lizards are usually welcomed into the homes of residents of the tropics. Arthur Loveridge, the noted herpetologist of Harvard's Museum of Comparative Zoology, tells us that in some districts where the Tokay Gecko occurs the occupants of a new house anxiously await the arrival of the first gecko, "venturing to predict something of their own future fortunes from the number of days that elapse before its appearance. Apparently the sooner it comes, the better are

The eye of the Tokay in daylight with the pupil contracted until very little illumination falls on the light-sensitive retina.

Photographed in darkness by infra-red light, the pupil opens in the shape of a polygon, like the shutter of a cheap camera.

their prospects. Similarly it is a good omen for a Tokay to call at the birth of a child; the oftener its cry is repeated, the better for the baby."

But geckos are not always welcomed so warmly and there are numerous superstitions treating them as evil and venomous creatures. Throughout most of the American tropics these lizards are believed to be highly venomous. The belief is that the expanded portions of the digits contain venom glands. In some regions it is believed that when a gecko walks on a sleeping person the "victim" will acquire leprosy, or at least, break out with painful blisters wherever the toes touched. Sometimes these lizards are feared more than venomous snakes. Actually none are venomous and they are all completely harmless, except for the largest species which can only inflict a slightly painful nip. Fortunately these superstitions are dying out and the geckos are becoming more and more appreciated as interesting, beneficial and frequently entertaining animals.

In his *Sketches of the Natural History of Ceylon,* J. E. Tennent relates the following tale about one of the large geckos:

"In an officer's quarters in the fort of Colombo, a gecko had been taught to come daily to the dinner-table, and always made its appearance along with the dessert. The family was absent for some months, during which the house underwent extensive repairs, the roof having been raised, the walls stuccoed, and the ceilings whitened. It was naturally surmised that so long a suspension of its accustomed habits would have led to the disappearance of the little lizard; but on the return of its old friends, it made its entrance as usual at their first dinner the instant the cloth was removed."

News from the Conservation Foundation

Changing Earth

Messrs. Osborn and Ordway have been invited to participate in the Wenner-Gren Foundation international conference to be held June 16 to 22 at Princeton University. The conference will treat of "Man's Role in Changing the Face of the Earth," and Mr. Ordway has been invited to deliver a paper on "Possible Limits of Essential Raw Material Consumption."

Summary Description

A brief description of the purposes, organization and activities of the Conservation Foundation has just been published for public distribution. This booklet is also available from the Foundation.

Historical Study Completed

"A History and Projection of Population Growth in Jamaica" is the subject of a year's review of Jamaican demography by George W. Roberts of the British Development and Welfare Organization at Barbados.

Watersheds and Forests

The Conservation Foundation was a co-sponsor of the American Watershed Congress, held in Washington in December. Mr. Osborn served as Chairman of the opening session.

The Foundation among others has been invited to review the new Forest Resource Resurvey to be issued by the U. S. Forest Service.

Geographical Conference

Vice-president George Brewer and Mr. Peter Stern of the Conservation Foundation staff participated in a formal conference of geographers held at Yale University early in January. The conference considered methods of expanding the teaching of geography, with particular emphasis on the relation of life to environment.

Food and Immigration

The British Committee on Political and Economic Planning is about to publish an analytical paper, under the joint authorship of President Fairfield Osborn and Professor Kingsley Davis of

Columbia University, on the limits of the ability of the United States to feed undernourished and overpopulated areas of the world, and our capacity to absorb substantially more immigrants. Copies of this paper are available from the Conservation Foundation.

Education Films

Distribution of the new Junior Conservation Series of motion pictures, "Your Friend the Water," "Your Friend the Soil" and "Your Friend the Forest," has been launched by Encyclopaedia Britannica Films, Inc.

A 35 mm. version of the "Making of the River" has been completed and we are hoping for theatrical release in New York City and elsewhere. Coronet Films on January 1 released the 16 mm. version both in black and white and in color.

Editorial Appointment

Vice-president Robert Snider, in charge of research for the Conservation Foundation, has been appointed to the Editorial Board of the *Journal of Soil and Water Conservation* published by the Soil Conservation Society of America.

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Election of Two Fellows and a Photographic Consultant

The Zoological Society is pleased to announce the election of two Fellows and a Photographic Consultant. Dr. Sophie Jakowska, Assistant Professor of Biology at the College of Mount St. Vincent, and Dr. Aubrey Gorbman, Chairman of the Department of Zoology of Barnard College, have been made Fellows in recognition of their scientific work in association with the Society, and Henry M. Lester, a specialist in high-speed photography who has been working on technical details of our motion picture program, has been named Photographic Consultant.

Zoological Park Miscellany

The distinction of being the first baby of the new year goes to a Nyala, born on January 2. Three other Nyalas, an Angola Colobus Monkey and a Blue Duiker hybrid were end-of-the-year arrivals. . . . A Gray Seal, new to our collection, has been received as a gift of Dr. T. W. M. Cameron of McGill University. It was captured as a pup just a year ago, and has settled down well in our Harbor Seal Pool. In fact, it is so much at home that we have to take precautions to insure that the little Harbor Seal gets enough to eat. — W.Br.

We Have a Callimico, but Is It a Marmoset or a Monkey?

On December 19 the Mammal Department was interested to receive a small black primate that purportedly had been captured some weeks before in the upper reaches of the Amazon, near Iquitos, Peru. This little black animal was, to the best of our knowledge, the first specimen received by a North American zoological park — the first specimen, indeed, that we had ever seen either living or dead — of the Callimico, or Goeldi's "Marmoset," *Callimico goeldii* (Thomas). (Picture on Page 15).

The Callimico, which looks like a marmoset but really isn't one, has been the object of speculation and controversy as to its proper classification ever since it was originally described. This state of affairs has existed because the Callimico is peculiarly intermediary between the families of New World monkeys (Cebidae), and the marmosets (Callitrichidae), possessing some of the characteristics of each family. Externally, its facial aspect, foot structure and claw-like nails ally it to the marmosets. On the other hand, its dental formula, skull configuration and convolvent or upward-whirling tail show its relationship to the New World monkeys. To this day, mammalogists do not agree as to whether the Calli-

mico should be grouped with the Cebidae or the Callitrichidae.

The first specimen ever to come to notice was one in the Zoological Gardens connected with the Pará Museum in Brazil. This animal was incorrectly identified by the Brazilian zoologist Goeldi as an aged specimen of Weddel's Marmoset, *Midas weddellii* (Deville). Oldfield Thomas, the famous British zoologist, recognized it as a new species, however. He described it under the name *Midas goeldii,* considering it a hitherto undescribed marmoset.

In 1911 another specimen, a female living in the same Zoological Gardens at Pará, was described by Professor Miranda Ribeiro as a new genus and species, *Callimico snethlageri.* He correctly considered it to be an intermediate form between the Titi Monkeys (*Callicebus*) and certain marmosets (*Mico*). By putting these two generic names together, he coined the new generic name *Callimico,* which was recognized as valid. Ribeiro was incorrect, however, in calling the animal a new species, for Oldfield Thomas recognized it as identical to the *Midas goeldii* that he had described seven years earlier. The specific name *goeldii* took precedence, and the Callimico finally was known by its proper scientific name, *Callimico goeldii.*

Very little concerning the natural history of the Callimico is known. The few specimens known to science have been taken in the region of the headwaters of the Amazon River, mainly in western Brazil and eastern Peru. It presumably is quite similar to the marmosets in its habits.

Adult specimens are described as being brownish-black in coloring, with two or three light buff-colored rings on the upper part of the tail and buffy markings on the nape of the neck. The young lack the light tail rings.

Our specimen, a young male, has no trace of tail rings, its fur being almost uniformly brownish-black. However, much of the hair on its nape and back is tipped with buff. The skin of its face is almost black, and the bare skin of its hands and feet are a sooty gray color in contrast to the skin on the rest of its body, which is a light flesh color.

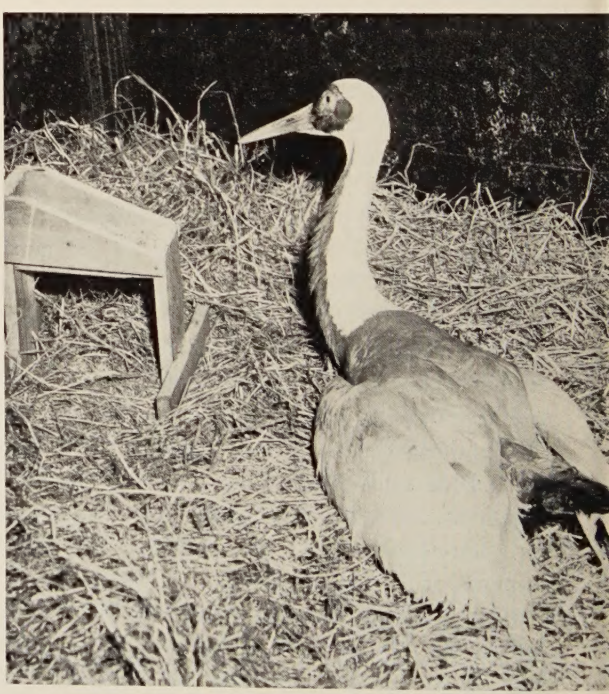
Our Callimico chirps and twitters like a marmoset, and is being given a marmoset diet in captivity. It is quite fond of American chameleons and very likely feeds on small lizards and insects in the wild, as well as on various fruits and seeds. — R.M.McC.

Nothing Fancy — But the Crane Is Able to Walk Again

The crudest kind of sling — an old burlap bag and some cord — seems to have worked wonders with a White-necked Crane in our collection.

On November 29 Keeper Bell of the Aquatic Bird House reported that the crane was extremely weak, unwilling to eat and unable to stand. It was obviously suffering from a severe respiratory infection, and was removed to the Animal Hospital and placed on a schedule of intravenous feeding with daily injections of an antibiotic.

Improvement was rapid in the next few days and the respiratory infection was overcome, but the bird still lacked the use of its legs. Under Assistant Veterinarian Gandal's direction, Hospital Attendant Waltz rigged up a sling to suspend the crane so it could exercise its legs. Three times a day, for half-hour periods, the bird "stood" in the sling and after two weeks was able to stand alone. The following day it was able to walk about its cage, and early in January it was



The White-necked Crane couldn't get up.

considered completely recovered and was discharged from the Hospital. — W.Br.

In Dull Times Between Murders — Relax at the Bronx Zoo!

Besides serving as a place of relaxation for flesh-and-blood New Yorkers, the Bronx Zoo on occasion performs that function for fictional characters. In "Vamp Till Ready" by Terry Rieman, published by Harpers, a tense moment in the life of the murder mystery's heroine is relieved by a visit to the Bronx Zoo.

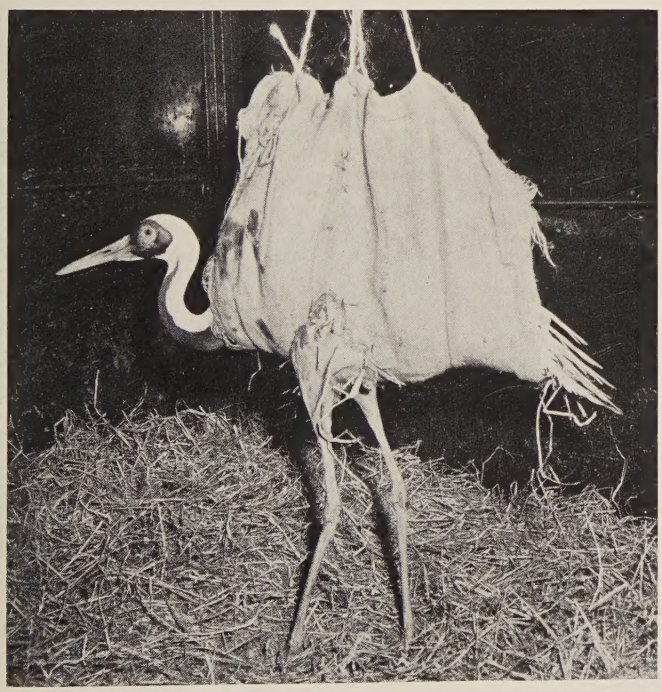
"And the atmosphere at the zoo, when Nicky and I got there, was much nicer than that surrounding lunch. It was cool and crisp and sunshiny, with squirrels, fat and sleek, playing everywhere and all of the animal-food vending machines working for once. [Internal evidence that the author *has* visited the Zoo, more than once, for the animal-food vending machines do sometimes run out of food!]. There was a new penguin house to be admired and a new baby elephant who blew at me indignantly when I ran out of food for her. There were two baby tigers, with paws the size of soup plates, still coated with fluffy kitten fur, who felt playful. And the spectacle of a great and glowing tiger, surely the most magnificent animal in the world, stretching himself up the bars of his cage like an affectionate tabby against a leg, so that the diminutive Mrs. Martini who had raised him from a cub could scratch his tummy while he purred an enormous sound, which was one I shall never forget."

PUBLICATIONS OF INTEREST

MY ZOO FAMILY. By Helen Martini. 295 pp., 32 pp. of photographs. Harper & Brothers, New York, 1955. $3.95.

Mrs. Martini must need little introduction to most of our Members. The Animal Nursery in the Zoological Park has been in her charge ever since we established it some ten years ago, and its inmates and their foster mother have been a never-failing source of charming illustrations for our magazine and lively scenes for our motion pictures. Television and radio shows, many of them on a national scale, have on innumerable occasions testified to the public's fascination by a job that involves the rearing of exotic wild animals. "My Zoo Family" is Mrs. Martini's own account of the tribulations and triumphs, hard work and fun, that have filled her days and many an anxious night since the morning, a dozen years ago, when her keeper-husband brought home a new-born Lion whose mother refused to care for it.

Subsequently in the Martini home and in the Nursery in the Zoological Park there has been a succession of babies — tigers, leopards, gorillas, orang-utans, fawns, monkeys and marmosets and even such rarities as Tarsiers and a Yapock — and on all of them Mrs. Martini has lavished the affection and understanding and tireless care that are the secrets of her very real success with animals. In "My Zoo Family" she tells in considerable detail of her daily life in the Animal Nursery and in the two other animal buildings where, as supplementary jobs, she performed the duties of a regular keeper. The book is illustrated by fifty of the most striking and appealing of the hundreds of photographs made in the



A crude sling held it up.

And now it walks again.

Nursery, the Martini home and in the Zoo, by Staff Photographer Dunton and by news photographers of the various picture services. — W.Br.

THE TIGERS OF TRENGGANU. By Lt. Col. A. Locke. Thirty-eight illustrations, two maps. Charles Scribner's Sons, New York, 1954. $3.50.

Colonel Locke's book is not merely a series of hunting stories but essentially an account of the habits and natural history of the strongly marked but somewhat diminutive tigers of a specific area of Malaya. Trengganu is a State lying perhaps half way up the eastern side of the great peninsula that lies to the north of Singapore. Its inhabitants are mostly Malays, with a scattering of Chinese who, through the centuries, have made but little impression upon the almost impenetrable forests and swamps. Here the tiger is completely at home, hampered but little by the occasional forays of villagers in defense of their livestock and occasionally their lives.

Colonel Locke writes with modesty and restraint but the story of the Jerangau Man-eater closely rivals the spine-chillers of Jim Corbett's "Man-eaters of Kumaon." A chapter on "Superstitions and Legends" and a detailed index round out this excellent volume. — L.S.C.

New Members of the New York Zoological Society

(Between November 1 and December 31, 1954)

Fellow

Dr. Aubrey Gorbman
Dr. Sophie Jakowska

Life

Ingram S. Carner
Wm. E. S. Griswold, Sr.
Bayard W. Read

Contributing

Archibald G. Alexander
Richard Allega
Mrs. Charles Allen, Sr.
Charles Betts
Miss Audrey Bruce
Mrs. Randolph P. Compton
Mrs. G. G. Dominick
Russel E. Duvernoy
Paul A. Draper
Bob Dvorin
Harry Eldridge
Mrs. Alice R. Evans
William K. Frank
John Harper
R. D. Holbrook
Jack Isreeli
Edward James
Miss Margaret I. Jensen
Louis Kenedy
William Kim
Dr. George H. H. Knight
Mrs. James F. Lawrence
Edward S. Litchfield
Mrs. John Adams Mayer
Jonathan W. McCann
John L. McCormick
Edward C. Meagher
F. Hamilton Merrill, Jr.
E. Moucha
Mrs. William S. Paley
Henry L. Pierson
John Pierrepont
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Mrs. David R. Raynolds
Alfred L. Rose
Winthrop H. Smith, Jr.
Roger W. Straus, Jr.
John T. Terry
Mrs. James L. Thatcher
Ethelbert Warfield
Mrs. Arnold Whitridge
Harry Zelenko
Dr. Clarence P. Zepp, Jr.

Annual

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Ward Ames
A. B. Alexander
Charles J. Ayer
Mrs. Harold d'o. Baker
Walter Bareiss
Miss Ada M. Bartoli
E. Farrar Bateson, Jr.
Philip Bergh
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Jackson R. Bryer
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Charles Chiusano
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Miss Susan Faragoh
Dr. Charles E. Farr
Master Jed Feuer
Paul Fitzpatrick
Miss Ann A. Fowler
Douglas Joel Futuyma
Wm. T. Genth
Mrs. Fitch Gilbert
Edward Graeffe
Hon. Ralph W. Gwinn
Miss Adele Hall
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Harold M. Iseman
Mrs. Carle Jackson
Mrs. Thea Katzenstein
Miss Neissa Kubel
Dr. A. R. Lamb, Jr.
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Robert W. Lewine
Mrs. William A. Lincoln
Budd Lytton
Mrs. Paul Mazur
Dr. J. William Maller
Mrs. Ruth McGinty
Henry Meltzer
Miss Caroline Minetto
Miss Antonia Munroe
Mrs. Andre Newburg
Marshall O'Connell
Mrs. Arthur Oesterheld
James S. Ottenberg
Mrs. Paul G. Pennoyer
Master Kenneth E. Phillips
Richard Prince
Miss Lucinda H. Rand
Robert J. Reichert
Dr. Conrad M. Riley
Mrs. Salvador Ros
Dr. William L. Rumsey
Mrs. John Barry Ryan
Mrs. Peter Schoenburg
Mrs. Edward R. Schwartz
Morris Shelby
Donald N. Smith
Miss Barbara Sally Smyth
Peter V. Snyder, Jr.
Mrs. Harold Speert
John Philip Stern
Saul Sulkow
George Van Gorder
Harry Viosca
Hunt T. Wagstaff
Lawrence Waring
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Charles Wissel
John P. West, Jr.
David Ogden Woolsey
George W. Young